APPLICATION

FOR UNITED STATES LETTERS PATENT

TITLE: AXLE STRAIGHTENING PRESS

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CROSS REFERENCE TO RELATED APPLICATION

This application is a non-provisional application of and claims priority to provisional application Serial No. 60/411,635, filed on 09/18/2002, the disclosure of which is herein incorporated by reference.

SPECIFICATION

TO ALL WHOM IT MAY CONCERN:

BE IT KNOWN THAT I, William E. Launius, Jr., a citizen of the United States of America and a resident of the State of Illinois, have invented new and useful improvements in an **AXLE STRAIGHTENING PRESS** as described in this specification:

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an axle straightening press for use as a hand tool in connection with model cars. The axle straightening press has particular utility in connection with straightening axles.

Description of the Prior Art

As winter loosens its grip, children emerge from homes across the land for a contest: the Pinewood Derby®. For the derby, children and their adult sponsors assemble a wooden car from a kit and then race their cars against those of fellow children upon a track with guideways for each car. Children that win local races advance to tournaments. In a car race, speed remains essential to victory and fractions of a second count. Children and sponsors seek to minimize wheel friction and to align wheels precisely at each opportunity. The wooden cars have four wheels. Each plastic wheel has a finished face, a rim, and a centered hub opposite the finished face. The hub fits over an axle hammered into the car. Spinning upon the axle, the hub contacts the car.

A unique aspect of the present invention is straightening an axle manually with minimal risk of injury and only a hammer. In a press, an axle straightens under a compressive force uniformly applied. A straight axle parallels the axis of rotation of the wheel allowing the wheel complete contact with the track and not the guideway. Prior art designs straightened axles by visual and tactile observation. Because of imprecise hammering and sore thumbs, children had less involvement in fine-tuning the axles for their cars and slower cars. In summary, prior art requires a hammer and the coordination of an adult while children sat out the fine-tuning of their cars for speed.

The present art overcomes the limitations of the prior art. The difficulty in straightening axles by children with minimal injury is shown by the operation of the typical method. From the factory and handling, axles have slight imperfections. Installed upon a car, an as delivered axle may cause binding of the hub and will alter the toe and camber of the wheel adversely. The wheel makes partial contact with the track and the guideway, increasing friction and reducing speed of the car. Typically, sponsors and children straighten axles by hand and eye with a hammer. A

sponsor would roll an axle upon a flat surface until the axle rotated longitudinally to its highest point. Then to straighten the axle, a conventional method requires a sponsor to hold the axle at its highest point and then to hit the highest point with a hammer. Such a manual method may not accurately straighten the hub and result in injuries to fingers and thumbs. The present invention overcomes this difficulty.

That is, the art of the present invention allows children to straighten their axles. Axle straightening presses are desirable to reduce friction between a hub and an axle, and for a more precise orientation of a rim with the track.

The use of wire straighteners, akin to the present invention, is known in the prior art. For example, United States Patent Number 3,993,918 to Broyles discloses a nail straightener. However, the Broyles '918 patent does not have grooves perpendicular to the direction of the hammer blows, and has further drawbacks of jamming a nail between the wedge and the anvil and of having a solid part and a hollow part.

U.S. Pat. No. 4,116,037 to Honeycutt discloses a tubing sizer and straightener that uses lever action. However, the Honeycutt '037 patent does not have alignment dowels, and cannot operate with hammer blows.

Similarly, U.S. Pat. No. 2,278,293 to Watson discloses a forging apparatus that alters a cylindrical blank into a mandrel with an expanded head. However, the Watson '293 patent does not have alignment dowels, does not hammer perpendicular to the length of the blank, and cannot operate without retaining the dies.

Similarly, U.S. Pat. No. 2,793,859 to Darling et al. discloses a baseball bat and method of making the same. The Darling '859 disclosure shows pins aligning the dies. However, the Darling '859 patent does not operate without heating elements, and cannot compress a nail nor a wooden bat blank in a time period less than 15 minutes.

Similarly, U.S. Pat. No. 5,161,584 to Krainaker et al. discloses a wire straightener for accommodating different size wires. However, the Krainaker '584 patent does not straighten by hammering but rather by drawing of wire, and cannot have flat surface portions on the blocks.

Similarly, U.S. Pat. No. 4,412,565 to Bronberg discloses a wire straightener tool that has ridges perpendicular to a length of wire. However, the Bronberg '565 patent does not straighten by hammering but rather by drawing of wire across the ridges.

Similarly, U.S. Pat. No. 3,998,083 to Dilling discloses a straightening apparatus that advanced the tubing through the apparatus. A belt and pulley power the apparatus. However, the Dilling '083 patent does not straighten by hammering but rather by pushing and rotating the tubing through a joint, and cannot be operated by hand.

Lastly, U.S. Pat. No. 3,881,341 to Evans discloses a bar straightener that operates with lever action. However, the Evans '341 patent does not clamp round bars, and has the additional deficiency of not using hammering to straighten bars.

While the above-described devices fulfill their respective, particular objectives and requirements, the aforementioned patents do not describe an axle straightening press. The Broyles '918 patent makes no provision for grooves perpendicular to the direction of the hammer blows. The Honeycutt '037 patent lacks alignment dowels between jaws. Further, the Watson '293 patent lacks alignment dowels and requires a restraining frame. The Darling '859 patent makes no provision for operation without heating elements. The Krainaker '584, Bronberg '565, and Dilling '083 make no provision for hammering wire and tubing. And the Evans '341 patent makes no provision for round bars.

Therefore, a need exists for a new and improved axle straightening press. In this regard, the present invention substantially fulfills this need. In this respect, the axle straightening press according to the present invention substantially departs from the conventional concepts and designs of the prior art, and in doing so provides an apparatus primarily developed for the purpose of straightening axles.

SUMMARY OF THE INVENTION

In view of the foregoing disadvantages inherent in the known types of wire straighteners now present in the prior art, the present invention provides an improved axle straightening press, and overcomes the above-mentioned disadvantages and drawbacks of the prior art. As such, the general purpose of the present invention, which will be described subsequently in greater detail, is to provide a new and improved axle straightening press and method which has all the advantages of the prior art mentioned heretofore and many novel features that result in an axle straightening press which is not anticipated, rendered obvious, suggested, or even implied by the prior art, either alone or in any combination thereof.

To attain this, the present invention essentially comprises a press to straighten axles by hammer blows. The press has a male jaw and cooperating female jaw. The male jaw has a generally rectangular shape, a mating surface, a centered half channel upon the lateral axis of the mating surface, and one or more dowels extending perpendicular to the mating surface. Then the female jaw has a generally rectangular shape, a mating surface that abuts on a common plane with the male jaw, a centered half channel upon the lateral axis of the mating surface, and one or more holes extending perpendicular and into the mating surface. Aligning the male jaw together with the female jaw, the jaws close, the dowels fit snugly within the holes and the half channels cooperate to confine an axle.

And in an alternate embodiment, a press to straighten axles by hammer blows has two cooperating jaws. Each jaw has a generally rectangular shape, a mating surface, a centered half channel upon the lateral axis of the mating surface, one dowel extending perpendicular to the mating surface on one side of the half channel, and one hole extending perpendicular and into the mating surface on the other side of the half channel from the dowel. The dowel of one jaw aligns with the hole of the other jaw, the two jaws close together, and the half channels cooperate to confine an axle.

There has thus been outlined, rather broadly, the more important features of the invention in order that the detailed description thereof that follows may be better understood and in order that the present contribution to the art may be better appreciated.

The invention may also include two dowels: of cylindrical shape on opposite sides of a half channel, on a diagonal line, rounded on an end, that extend partially through the jaw thickness, and extend above the mating surface; two holes: of cylindrical shape matching the dowels on opposite sides of a half channel, on a diagonal line, and that extend through the jaw thickness; and on both of two jaws, a dowel and hole pair, with a cylindrical dowel, the dowel and hole located on opposite sides of a half channel, on a diagonal line, and the hole that extends through the jaw thickness. Additional features of the invention will be described hereinafter and which will form the subject matter of the claims attached.

Numerous objects, features and advantages of the present invention will be readily apparent to those of ordinary skill in the art upon a reading of the following detailed description of presently preferred, but nonetheless illustrative, embodiments of the present invention when taken in conjunction

with the accompanying drawings. In this respect, before explaining the current embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

As such, those skilled in the art will appreciate that the conception, upon which this disclosure is based, may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and the scope of the present invention.

It is therefore an object of the present invention to provide a new and improved axle straightening press that has all of the advantages of the prior art wire straighteners and none of the disadvantages.

It is another object of the present invention to provide a new and improved axle straightening press that may be easily and efficiently manufactured and marketed.

An even further object of the present invention is to provide a new and improved axle straightening press that has a low cost of manufacture with regard to both materials and labor, and which accordingly is then susceptible of low prices of sale to the consuming public, thereby making such axle straightening press economically available to children and their sponsors.

Still another object of the present invention is to provide a new axle straightening press that provides in the apparatuses and methods of the prior art some of the advantages thereof, while simultaneously overcoming some of the disadvantages normally associated therewith.

Even still another object of the present invention is to provide an axle straightening press for straightening axles. A straight axle precisely positions a spinning wheel. This allows a flat fit of the rim to the track, reducing friction, and increasing the speed of the car.

Still yet another object of the present invention is to provide an axle straightening press for straightening axles. This makes it possible for a child to finish an axle without a power tool.

Still yet another object of the present invention is to provide an axle straightening press for straightening axles. This makes it possible for a child to finish an axle with minimal risk of injury and less adult supervision.

Lastly, it is an object of the present invention to provide a new and improved method of straightening an axle for a model car typically by a child and his sponsor. The method has these steps: 1) cleaning an axle with sandpaper, 2) marking the head of the axle to track rotation of the axle, 3) assembling one jaw into the second jaw of a press, 4) inserting one or more dowels from one jaw into the other jaw and closing the jaws together, 5) placing the axle into the channel formed between the jaws of the press, 6) locating the press upon a solid surface and striking a jaw of the press repeatedly with a hammer, 7) partially rotating the axle at least twice and repeating placement and hammering of the press, 8) striking the head of the axle to square it, 9) removing the axle from the press and polishing the axle as desired.

These together with other objects of the invention, along with the various features of novelty that characterize the invention, are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. **1** shows a view of the male and female jaws of the preferred embodiment of the axle straightening press constructed in accordance with the principles of the present invention.

FIG. **2** shows a front view of the assembled jaws of the axle straightening press.

FIG. **3** shows a top view of the female jaw of the axle straightening press.

FIG. **4** shows a view of the alternate embodiment of the two similar jaws of the axle straightening press.

FIG. **5** shows a top view of a similar jaw of the axle straightening press.

The same reference numerals refer to the same parts throughout the various figures.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and particularly to FIGS. 1- 5, a preferred embodiment of the axle straightening press of the present invention is shown and generally designated by the reference numeral 10. The present art overcomes the prior art limitations in straightening an axle by a child with a hammer at minimal risk of injury. In Figure 1, a new and improved axle straightening press 10 of the present invention for straightening axles is illustrated and will be described. More particularly, the axle straightening press 10 appears in a view with a female jaw 20 and a male jaw 12. The female jaw 20 has a top surface T generally rectangular in shape with an opposing mating surface 14. The mating surface 14 has a generally rectangular shape with a centered and transverse half channel 16 in the mating surface 14. The half channel 16 has a semi-circular cross section on a plane parallel to the longitudinal axis of the mating surface 14. The half channel 16 has its diameter coplanar with the mating surface 14 and its depth extending toward the top surface T.

Opposite the female jaw 20, the axle straightening press 10 has a male jaw 12. The male jaw 12 has a bottom surface B generally rectangular in shape with an opposing mating surface 14. The mating surface 14 has a generally rectangular shape with a centered and transverse half channel 16 in the mating surface 14. The half channel 16 has a semi-circular cross section on a plane parallel to the longitudinal axis of the mating surface 14. The half channel 16 has its diameter coplanar with the mating surface 14 and its depth extending toward the bottom surface B. Extending away from the mating surface 14, two dowels 18 have a round cross section and generally cylindrical shape. The two dowels 18 are located along a diagonal line upon the mating surface 14 so that the dowels 18 are not opposite of each other on both the transverse and longitudinal axes of the mating surface 14. Opposite the mating surface 14, the dowels 18 have a rounded end 24 to ease insertion into the holes 22.

Turning to FIG. 2, the dowels 18 of the male jaw 12 insert into matching holes 22 in the female jaw 20. The half channels 16 of the male jaw 12 and the female jaw 20 come together and form a channel, round in cross section, slightly less than the diameter of an axle. The dowels 18 of the male jaw 12 fit snugly into holes 22 in the female jaw 20.

FIG. 3 shows the holes 22 in the female jaw 20 that pass through the depth of the female jaw 20. The holes 22 have a round shape that fits the dowels 18. The holes 22 are located along a diagonal line upon the mating surface 14 and top surface T so that the holes 22 are not opposite of each other on both of the transverse and longitudinal axes of the mating surface 14 and top surface T. The channel is perpendicular to the longitudinal axes of the holes 22 and the dowels 18. The dowels 18 and holes 22 have a matching regular spacing along a diagonal line upon the mating surface 14.

In Figure 4, an alternate embodiment of the axle straightening press 10 is illustrated and will be described. More particularly, the axle straightening press 10 appears in a view with two similar jaws 26. Each jaw 26 has a generally rectangular shape and a mating surface 14. The mating surface 14 has a generally rectangular shape with a centered and transverse half channel 16 machined into the mating surface 14. The half channel 16 has a semi-circular cross section on a plane parallel to the longitudinal axis of the mating surface 14. The half channel 16 has its diameter coplanar with the mating surface 14 and its depth extending toward the top surface T. Extending away from the mating surface 14, a dowel 18 has a round cross section and generally cylindrical shape. The dowel 18 is located symmetrically opposite the hole 22 with the dowel 18 on one side of the half channel 16 and the hole 22 on the other side. Opposite the mating surface 14, the dowels 18 have a rounded end 24 to ease insertion into the holes 22. The dowel 18 of one jaw 26 inserts into a matching hole 22 in a second jaw 26. The half channels 16 of the two jaws 26 come together and form a channel, round in cross section, slightly less than the diameter of an axle. The dowels 18 of the jaws 26 fit snugly into the holes 22.

Turning to FIG. 5, the similar jaws 26 each have a hole 22 and a dowel 18. The hole 22 in the jaw 26 passes through the thickness of the jaw 26 and has a round shape that receives a dowel 18. The hole 22 and dowel 18 are located on opposite sides of the half channel 16 upon the mating surface 14. The half channel 16 is perpendicular to the longitudinal axes of the holes 22 and the dowels 18. The dowels 18 and holes 22 have a matching regular spacing along the longitudinal axis of the mating surface 14. In an alternate spacing akin to FIG. 3, the dowels 18 and holes 22 have a matching regular spacing along a diagonal line upon the mating surface 14.

Typically, the axle straightening press 10 operates in many environments such as a basement workshop, a garage, trackside, and the like. To utilize the present art, a child cleans off

burrs and dust from the axle with sandpaper. The child then marks the axle head with a dot off center to track rotation of the axle. Grasping the assembled male jaw 12 and female jaw 20, the child inserts the dowels 18 to position the male jaw 12 with the female jaw 20 tightly. Then the child places the axle in the channel formed between the male jaw 12 and the female jaw 20. The dot is at the top, 12 o'clock position. Placing the assembled press 10 upon a solid surface, the child strikes the press 10 a few times with a hammer. Next, the child rotates the axle to at least two positions from the 12 o'clock position and repeats the placement and hammering of the press 10. After hammering the press 10 with the axle in at least two positions, the child strikes the head of the axle, squaring the head to the axle. The child then removes the axle from the press 10 and polishes the axle as desired.

To use the alternate embodiment, a child marks the axle head as before. The child places the dowel 18 of one jaw 26 into the hole 22 of a second jaw 26 so the half channels 16 align. Grasping the assembled jaws 26, the child brings the jaws 26 together and places the axle in the channel formed between the jaws 26. As described above, the dot is at the top, 12 o'clock position. Placing the assembled press 10 upon a solid surface, the child strikes the press 10 a few times with a hammer. Next, the child rotates the axle to at least two positions from the 12 o'clock position and repeats the placement and hammering of the press 10. After hammering the press 10 with the axle in at least two positions, the child strikes the head of the axle, squaring the head to the axle. The child then removes the axle from the press 10 and polishes the axle as desired.

While a preferred embodiment of the axle straightening press has been described in detail, it should be apparent that modifications and variations thereto are possible, all of which fall within the true spirit and scope of the invention. The axle straightening press and its various components may be manufactured from many materials including but not limited to ferrous and non-ferrous metals and their alloys, plastics, and composites. The preferred embodiment uses steel and rectangular cross sections in a plane perpendicular to the longitudinal axis of the invention for the male jaw and the female jaw and the two similar jaws. The preferred embodiment also uses steel cylinders of round cross section in a plane parallel to the mating surface for the dowels. With respect to the above description then, it is to be realized that the optimum dimensional relationships for the parts of the invention, to include variations in size, materials, shape, form, function and manner of operation, assembly and use, are deemed readily apparent and obvious to

one skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention. For example, any suitable sturdy material such as metal, plastic, or composite may be used instead of the steel dowels described. Also, the mating surface may be plated with a heavy-duty metal, plastic, composite or ceramic. Although straightening axles has been described, it should be appreciated that the axle straightening press herein described is also suitable for drawing and straightening wire. Furthermore, a wide variety of channel shapes may be used instead of the half channel in each jaw described.

From the aforementioned description, an axle straightening press has been described. The axle straightening press is uniquely capable of straightening axles for wheels with only a hammer and minimal risk of injury.

Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.